

WHAT IS CLAIMED IS:

1. A process for the preparation of a water-absorbent polymer which comprises:
 - (I) polymerizing a polymerization mixture comprising:
 - (a) one or more ethylenically unsaturated carboxyl-containing monomers,
 - (b) one or more crosslinking agents,
 - (c) optionally one or more comonomers copolymerizable with the carboxyl-containing monomer,
 - (d) a polymerization medium, and
 - (e) a chlorine- or bromine-containing oxidation agent to form a crosslinked hydrogel;
 - (II) comminuting the hydrogel to particles; and
 - (III) drying the hydrogel at a temperature of greater than 105°C;
wherein Fe(II) ions or Fe(III) ions or a mixture of both are added to the hydrogel prior to, during or after the comminution step (II) but prior to substantial drying of the hydrogel in step (III).
2. A process for the preparation of a water-absorbent polymer which comprises:
 - (I) polymerizing a polymerization mixture comprising:
 - (a) one or more ethylenically unsaturated carboxyl-containing monomers,
 - (b) one or more crosslinking agents,
 - (c) optionally one or more comonomers copolymerizable with the carboxyl-containing monomer,
 - (d) a polymerization medium, and
 - (e) a chlorine- or bromine-containing oxidation agent to form a crosslinked hydrogel;
 - (II) comminuting the hydrogel to particles; and
 - (III) drying the hydrogel at a temperature of greater than 105°C;

wherein Fe(II) ions or Fe(III) ions or a mixture of both are added in an amount of from 1 to 20 ppm, based on the total weight of monomers, to the polymerization mixture prior to step (I).

5 3. A process for the preparation of a water-absorbent polymer which comprises:

(I) polymerizing a polymerization mixture comprising:

- (a) one or more ethylenically unsaturated carboxyl-containing monomers,
 - (b) one or more crosslinking agents,
 - (c) optionally one or more comonomers copolymerizable with the carboxyl-containing monomer,
 - (d) a polymerization medium, and
 - (e) a chlorine- or bromine-containing oxidation agent to form a crosslinked hydrogel;
- 10 (II) comminuting the hydrogel to particles; and
- (III) drying the hydrogel at a temperature of greater than 105°C;
- 15 wherein Fe(III) ions are added to the polymerization mixture prior to step (I).

4. A process for the preparation of a water-absorbent polymer which comprises:

20 (I) polymerizing a polymerization mixture comprising:

- (a) one or more ethylenically unsaturated carboxyl-containing monomers,
- (b) one or more crosslinking agents,
- (c) optionally one or more comonomers copolymerizable with the carboxyl-containing monomer, and
- (d) a polymerization medium to form a crosslinked hydrogel;

25 (II) comminuting the hydrogel to particles;

(III) applying to the hydrogel a chlorine- or bromine-containing oxidation agent prior to, during or after the comminution step (II); and

30 (IV) drying the hydrogel at a temperature of greater than 105°C;

wherein Fe(II) ions or Fe(III) ions or a mixture of both are added in at least one of the following steps:

- (i) prior to the comminution step (II) or
- (ii) after the comminution step (II) but prior to substantial drying of the hydrogel in step (IV).

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5. A process for the preparation of a water-absorbent polymer which comprises:

- (I) polymerizing a polymerization mixture comprising:
 - (a) one or more ethylenically unsaturated carboxyl-containing monomers,
 - (b) one or more crosslinking agents,
 - (c) optionally one or more comonomers copolymerizable with the carboxyl-containing monomer, and
 - (d) a polymerization medium
- 10 to form a crosslinked hydrogel;
- (II) comminuting the hydrogel to particles;
- (III) applying to the hydrogel a chlorine- or bromine-containing oxidation agent prior to, during or after the comminution step (II); and
- (IV) drying the hydrogel at a temperature of greater than 105°C;

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wherein Fe(II) ions or Fe(III) ions or a mixture of both are added in an amount of from 1 to 20 ppm, based on the total weight of monomers, to the polymerization mixture prior to or during step (I).

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6. A process for the preparation of a water-absorbent polymer which comprises:

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- (I) polymerizing a polymerization mixture comprising:
 - (a) one or more ethylenically unsaturated carboxyl-containing monomers,
 - (b) one or more crosslinking agents,
 - (c) optionally one or more comonomers copolymerizable with the carboxyl-containing monomer, and
 - (d) a polymerization medium
- 30 to form a crosslinked hydrogel;

- (II) comminuting the hydrogel to particles;
 - (III) applying to the hydrogel a chlorine- or bromine-containing oxidation agent prior to, during or after the comminution step (II); and
 - (IV) drying the hydrogel at a temperature of greater than 105°C;
- 5 wherein Fe(III) ions are added to the polymerization mixture prior to step (I).
7. The process of Claim 1 further comprising (IV) grinding, screening and heat treating the dried hydrogel after step (III).
- 10 8. The process of Claim 2 further comprising (IV) grinding, screening and heat treating the dried hydrogel after step (III).
9. The process of Claim 3 further comprising (IV) grinding, screening and heat treating the dried hydrogel after step (III).
- 15 10. The process of Claim 4 further comprising (V) grinding, screening and heat treating the dried hydrogel after step (IV).
11. The process of Claim 5 further comprising (V) grinding, screening and heat 20 treating the dried hydrogel after step (IV).
12. The process of Claim 6 further comprising (V) grinding, screening and heat treating the dried hydrogel after step (IV).
- 25 13. The process of Claim 1 wherein the Fe(II) ions or Fe(III) ions or a mixture of both are added in a total amount of from 1 to 20 ppm, based on the total weight of monomers.
14. The process of Claim 3 wherein the Fe(III) ions are added in an amount of from 1 30 to 20 ppm, based on the total weight of monomers.

15. The process of Claim 4 wherein the Fe(II) ions or Fe(III) or a mixture of both are added in a total amount of from 1 to 20 ppm, based on the total weight of monomers.
- 5 16. The process of Claim 6 wherein the Fe(III) ions are added in an amount of from 1 to 20 ppm, based on the total weight of monomers.
- 10 17. The process of Claim 1 wherein the Fe(II) ions are derived from iron (II) acetate, iron (II) chloride, iron (II) sulfate, iron (II) acetate, iron (II) bromide, iron (II) citrate, iron (II) lactate or iron (II) nitrate or mixtures thereof.
18. The process of Claim 1 further comprising a surface crosslinking step (IV).
- 15 19. The process of Claim 1 wherein the Fe(III) ions are derived from iron (III) chloride, iron (III) sulfate, iron (III) bromide, iron (III) citrate, iron (III) lactate, iron (III) nitrate or iron (III) oxalate or mixtures thereof.
- 20 20. The process of Claim 7 wherein the dried hydrogel from step (III) is heated to a temperature of from 170 to 250 °C for from 1 to 60 minutes in the heat treatment step (IV).
- 25 21. The process of Claim 1 wherein the chlorine- or bromine-containing oxidizing agent is selected from the group consisting of sodium chlorate, potassium chlorate, sodium bromate, potassium bromate, sodium chlorite and potassium chlorite or mixtures thereof.
22. The process of Claim 2 wherein the chlorine- or bromine-containing oxidizing agent is selected from the group consisting of sodium chlorate, potassium chlorate, sodium bromate, potassium bromate, sodium chlorite and potassium chlorite or mixtures thereof.
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23. The process of Claim 3 wherein the chlorine- or bromine-containing oxidizing agent is selected from the group consisting of sodium chlorate, potassium chlorate, sodium bromate, potassium bromate, sodium chlorite and potassium chlorite or mixtures thereof.

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24. The process of Claim 4 wherein the chlorine- or bromine-containing oxidizing agent is selected from the group consisting of sodium chlorate, potassium chlorate, sodium bromate, potassium bromate, sodium chlorite and potassium chlorite or mixtures thereof.

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25. The process of Claim 5 wherein the chlorine- or bromine-containing oxidizing agent is selected from the group consisting of sodium chlorate, potassium chlorate, sodium bromate, potassium bromate, sodium chlorite and potassium chlorite or mixtures thereof.

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26. The process of Claim 6 wherein the chlorine- or bromine-containing oxidizing agent is selected from the group consisting of sodium chlorate, potassium chlorate, sodium bromate, potassium bromate, sodium chlorite and potassium chlorite or mixtures thereof.

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27. This invention relates to a process for the preparation of a water-absorbent polymer, the process comprising

(I) polymerizing a polymerization mixture comprising:

(a) one or more ethylenically unsaturated carboxyl-containing monomers,

(b) one or more crosslinking agents,

(c) optionally one or more comonomers copolymerizable with the carboxyl-containing monomer,

(g) a polymerization medium, and

25 to form a crosslinked hydrogel,

(II) comminuting the hydrogel to particles and

30 (III) drying the hydrogel at a temperature of greater than 105°C;

wherein, under conditions sufficient to reduce the residual monomer level in the polymer product, the following are independently added to the process prior to substantial drying of the hydrogel in step (III): (a) Fe(III) ions; and (b) at least one chlorine- or bromine-containing oxidation agent.